Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (Original) In a gas-scrubbed assembly comprising, a microfiltration membrane device in combination with a gas-distribution means to minimize build-up of particulate deposits on the surfaces of hollow fiber membranes ("fibers") in said device, and to recover permeate from a multicomponent liquid substrate while leaving particulate matter therein, said membrane devicecomprising,

a multiplicity of fibers, unconfined in a shell of a module, said fibers being swayable in said substrate, said fibers being subject to a transmembrane pressure differential in the range from about 0.7 kPa (0.1 psi) to about 345 kPa (50 psi);

a first and second header disposed in transversely spaced-apart relationship within said substrate, each header being formed with a potting resin cured in a resin-confining means;

said first header and second header having opposed terminal end portions of each fiber sealingly secured therein, all open ends of said fibers extending from a permeate-discharging face of at least one header;

permeate collection means to collect said permeate through at least one of said headers sealingly connected in open fluid communication with permeate-discharging faces of said headers;

means for withdrawing said permeate; and,

said gas-distribution means is located within a zone beneath said skein, said gas-distribution means having through-passages therein adapted to have sufficient gas flowed therethrough to generate enough bubbles flowing in a column of rising bubbles between and around said skein fibers, to keep surfaces of said fibers awash in bubbles;

said fibers, said headers and said permeate collection means together forming a vertical cylindrical skein wherein said fibers are essentially vertically disposed; said first header

being upper and disposed in vertically spaced-apart relationship above said second header with opposed faces of said headers at a fixed distance, said fibers being substantially concentrically disposed relative to the vertical axis between said headers;

each of said fibers having substantially the same length, said length being from at least 0.1% greater, to less than 5% greater than said fixed distance so as to permit restricted displacement of an intermediate portion of each fiber, independently of the movement of another fiber;

the improvement comprising,

each said header having said fibers spaced apart by a flexible support means having a thickness corresponding to a desired lateral spacing between adjacent fibers, said support means extending over only each terminal portion of said fibers near their ends, so as to maintain said ends in closely-spaced apart relationship,

said gas distribution means being disposed between said fibers and having through-passages adapted to discharge said bubbles which rise vertically substantially parallel to, and in contact with said fibers, movement of which is restricted within said column;

whereby said permeate is essentially continuously withdrawn.

Claim 2. (Original) The gas-scrubbed assembly of claim 1 wherein,

said restricted displacement is in the lateral or horizontal direction,

said headers are non-removably formed within said resin-confining means, and, said gas-distribution means includes an aerator means disposed adjacent to said lower header's upper face discharging said gas in an amount in the range from 0.47-14 cm^3/sec per fiber (0.001 scfm/fiber to about 0.03 scfm/fiber), said aerator means generating bubbles having an average diameter in the range from about 0.1 mm to about 25 mm, said bubbles maintain outer surfaces of said fibers essentially free from build-up of deposits of said particulate matter.

Claim 3. (Original) The gas-scrubbed assembly of claim 2 wherein,

said gas-distribution means includes a vertical member centrally axially disposed within said skein and through at least one said header;

said length is from 1% to less than 5% greater than said fixed distance,

said fibers together have a surface area >1 m^2, each fiber has a length >0.5 meter,

said fibers together have a surface area in the range from 10 to 10^3 m^2,

said headers are vertically adjustable to provide said fixed distance, and,

said bubbles are in the size range from 1 mm to 25 mm measured in relatively close proximity, in the range from 1 cm to about 50 cm, to said through-passages.

Claim 4. (Original) The gas-scrubbed assembly of claim 2 wherein,

each header includes both, a fiber-setting form to hold and set said fibers in a chosen pattern, and spacer means to maintain desired fiber-to-fiber spacing within said skein, said both being integral with said header;

said fibers are potted within said synthetic resinous material to a depth in the range from about 1 cm to about 5 cm and protrude through a permeate-discharging face of each said header in a range from about 0.1 mm to about 1 cm.

Claim 5. (Original) The gas-scrubbed assembly of claim 3 wherein,

said permeate collection means includes a vertical member coaxially disposed within said gas distribution means' vertical member,

said substrate is maintained at a pressure in the range from about 1-10 atm,

said transmembrane pressure differential is in the range from 3.5 kPa (0.5 psi) to about 175 kPa (25 psi),

opposed terminal end portions of said fibers are in open communication with each other through each said header;

said fibers are in the range from 0.5 m to 5 m long, and,

said terminal end portions of said fibers are potted within said mass of resin to a depth in the range from about 1 cm to about 5 cm.

Claim 6. (Original) The gas-scrubbed assembly of claim 5 wherein said particulate matter comprises biologically active microorganisms growing in said substrate.

Claim 7. (Original) The gas-scrubbed assembly of claim 5 wherein said particulate matter comprises finely divided inorganic particles.

Claim 8. (Original) The gas-scrubbed assembly of claim 1 wherein,

each said fiber is formed from a material selected from the group consisting of natural and synthetic polymers, has an outside diameter in the range from about 20 μm to about 3 mm, a wall thickness in the range from about 5 μm to about 2 mm, and, a pore size in the range from 1000 Å to 10000 Å, each said header is a cylindrical disc having substantially the same dimensions, and, said gas is a molecular oxygen-containing gas.

Claim 9. (Original) In a microfiltration membrane device, for withdrawing permeate essentially continuously from a multicomponent liquid substrate, said membrane device including:

a multiplicity of hollow fiber membranes, or fibers, unconfined in a shell of a module, said fibers being swayable in said substrate, said fibers being subject to a transmembrane pressure differential in the range from about 0.7 kPa (0.1 psi) to about 345 kPa (50 psi);

a first header and a second header disposed in transversely spaced-apart relationship with said second header within said substrate;

said first header having a terminal end portion of each fiber secured therein, and said second header having an opposed terminal end portion of each fiber secured therein, all said fibers extending from a permeate-discharging face of at least one said header;

said fibers being sealingly secured with open ends of the fibers secured in fluid-tight relationship with each other in at least one of said headers;

permeate collection means to collect said permeate through at least one of said headers sealingly connected in open fluid communication with permeate-discharging faces of said headers;

and, means for withdrawing said permeate;

said fibers, said headers and said permeate collection means together forming a vertical cylindrical skein wherein said fibers are essentially vertically disposed; said first header being upper and disposed in vertically spaced-apart relationship above said second header, with opposed faces at a fixed distance;

each of said fibers having substantially the same length, said length being from 0.1% to less than 5% greater than said fixed distance so as to permit restricted displacement of an intermediate portion of each fiber, independently of the movement of another fiber;

the improvement comprising,

each said header having said fibers spaced apart by a flexible support means having a thickness corresponding to a desired lateral spacing between adjacent fibers, said support means extending over only each terminal portion of said fibers near their ends so as to maintain said ends in closely-spaced apart relationship.

Claim 10. (Original) The membrane device of claim 9 wherein,

each said header is a mass of synthetic resinous material in which said terminal end portions are potted and said fibers are formed from natural or synthetic polymers;

each said fiber has an outside diameter in the range from about 20 μm to about 3 mm, a wall thickness in the range from about 5 μm to about 2 mm, pore size in the range from 1,000 Å to 10,000 Å; and,

said displacement is in the lateral or horizontal direction.

Claim 11. (Original) The membrane device of claim 10 wherein,

said permeate collection means includes a vertical member axially disposed through

said headers and within said skein,

said substrate is maintained at a pressure in the range from about 1-10 atm, said fibers extend as a skein upwardly from a fiber-supporting face of each of said headers, each header has substantially the same dimensions, said fibers extend downwardly

through the permeate-discharging face of said headers, and said permeate is discharged upwardly relative to said upper header.

Claim 12. (Original) The membrane device of claim 11 wherein,

said fibers together have a surface area >1 m^2, each fiber has a length >0.5 meter, said fibers together have a surface area in the range from 10 to 10^3 m^2 and, said terminal end portions of said fibers protrude through a permeate-discharging face of each said header in a range from about 0.1 mm to about 1 cm.

Claim 13. (Original) In a process for maintaining the outer surfaces of hollow fiber membranes essentially free from a build-up of deposits of particulate material while separating a permeate from a multicomponent liquid substrate in a reservoir, said process comprising,

submerging skein fibers in an essentially vertical, cylindrical configuration within said substrate, said fibers being unconfined in a modular shell, and securely held in vertically opposed, upper and lower headers spaced-apart at a fixed distance, said fibers having substantially the same length and from at least 0.1% greater, to about 5% greater than said fixed distance, a transmembrane pressure differential in the range from about 0.7 kPa (0.1 psi) to about 345 kPa (50 psi), and length sufficiently greater than the direct distance between opposed faces of said first and second headers, so as to present said skein in a swayable configuration above a horizontal plane through the horizontal center-line of said lower header;

mounting said headers in fluid-tight open communication with collection means to collect said permeate;

flowing a fiber-cleaning gas through a gas-distribution means proximately disposed relative to said skein, within a zone beneath said skein, and contacting surfaces of said fibers with sufficient physical impact of bubbles of said gas to maintain essentially the entire length of each fibers in said skein awash with bubbles and essentially free from said build-up;

maintaining an essentially constant flux through said fibers substantially the same as an equilibrium flux initially obtained after commencing operation of said process;

collecting said permeate in said collection means; and, withdrawing said permeate,

the improvement comprising,

introducing said cleansing gas between said fibers within said skein to generate a column of said bubbles alongside and in contact with outer surfaces of said fibers; said fibers spaced apart by a flexible support means having a thickness corresponding to a desired lateral spacing between adjacent fibers, said support means extending over only each terminal portion of said fibers near their ends, so as to maintain said ends in closely apart relationship;

restricting movement of said fibers to said vertical zone defined by lateral movement of outer fibers in said skein;

vertically gas-scrubbing said fibers outside surfaces with bubbles which flow upward in contact with said surfaces;

maintaining said surfaces substantially free from said deposits of particulate matter during a period when flux through said fibers has attained equilibrium; and simultaneously, essentially continuously, withdrawing said permeate.

Claim 14. (Original) The process of claim 13 wherein,

each said hollow fiber has an outside diameter in the range from about 20 μm to about 3 mm, and a wall thickness in the range from about 5 μm to about 1 mm;

said particulate matter is selected from the group consisting of microorganisms and finely divided inorganic particles; and,

said gas-distribution means discharges gas in an amount in the range from 0.47-14 cm^3/sec per fiber (0.001 scfm/fiber to about 0.03 scfm/fiber) and generates bubbles having an average diameter in the range from about 1 mm to about 25 mm.

Claim 15. (Currently Amended) A system for [treating a multicomponent] withdrawing permeate from a liquid substrate while leaving particulate matter therein, comprising,

(a) a non-pressurized reservoir other than a shell of a module for containing the substrate;

(b) [a cylindrical skein] an assembly having a plurality of hollow fiber filtering membranes immersed in the substrate each [fiber] membrane having a length greater than 0.5 m, the [fibers] membranes together providing a surface area of at least greater than 1 m^2 and disposed generally vertically between upper and lower generally cylindrical [headers] solid bodies comprised of a potting material with (i) the [headers] solid bodies having the [fibers] membranes sealingly secured therein so as to prevent the substrate from contaminating the permeate, at least a portion of the [fibers] membranes spaced apart from adjacent membranes by the potting material to a center to center distance in the range from 1.2 to 5 times the outside diameter of the membranes [by a flexible support means having a thickness corresponding to a desired lateral spacing between adjacent fibers, said support means extending over a portion of said fibers near their ends, so as to maintain said ends in closely-spaced apart relationship], (ii) lumens of said [fibers] membranes being in fluid communication with [at least] [one] a permeate [collection means] pan connected to one of the solid bodies and immersible in the substrate or to a pair of permeate [collection means] pans connected one to each of the solid bodies and both immersible in the substrate, and, (iii) said [fibers] membranes having a length between opposed surfaces of the [headers] solid bodies, in the range from 0.1% to 5% greater than the distance between opposed surfaces of the [headers] solid bodies;

(c) a pump in fluid communication with said lumens of said membranes through at least one permeate [collection means] pan, said pump operable to apply a suction to the lumens of the membranes to draw a

component of the substrate as permeate through said membranes while leaving particulate matter in said substrate; and,

(d) [aeration means] a gas-distribution system having through-passages with openings[,] distributed both radially and circumferentially [within the skein] between the membranes [for discharging air directly into the substrate near the] [base of the skein, the openings providing] [lower solid body to provide a column of bubbles rising from near] [the base of the skein] [lower ends of the membranes] operable to provide a flow a gas through the through-passages to produce bubbles in the substrate.

Claim 16. (Previously Presented) The system of claim 15 wherein the length is in the range from 0.1% to 1% greater than the distance between the opposed surfaces of the [headers] solid bodies.

Clam 17. (Currently Amended) The system of claim 16 wherein the [aeration means] gas distribution system further includes a rigid air supply tube for carrying air to the through-passages and for spacing and positioning the lower and upper [headers] solid bodies relative to one another.

Claim 18. (Previously Presented) The system of claim 17 wherein the air supply tube has additional through-passages along its length.

Claims 19-23. (Canceled)

Claim 24. (New) The system of claim 15 wherein lower ends of the membranes are plugged.